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A critique of research in trade and industrial teacher education was prepared from a bibliography of 35 studies completed between 1963 and 1967. Some of the conclusions based on the studies are: (1) A sizeable number of the research has been conducted by students as part of a doctoral program, (2) Recent increases in federal funding have not seemed to greatly improve the sophistication of research which has been directed specifically toward trade and industrial teacher education, and (3) The majority of the studies have been concerned with either the teacher education process or the teacher education product. The critique of research serves as a foundation for a model designed to better facilitate the study of trade and industrial teacher education--the model represents the existing teacher education process which may be viewed as a general teacher education model. However, it provides a unique categorical system of process and effects as well as a series of interdependencies in trade and industrial teacher education. The simplicity of the model permits one to develop as much detail as necessary to study a particular problem and provides a starting point from which research models can be developed. (HC)

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VOCATIONAL EDUCATION DEPARTMENT OF THE PENNSYLVANIA STATE UNIVERSITY

TRADE AND INDUSTRIAL TEACHER EDUCATION: A RESEARCH CRITIQUE AND MODEL FOR ACTION

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FORWARD

This report is the first of a continuing series which has been initiated by the Research Staff of the Vocational Education Department, The Pennsylvania State University. We are hopeful that through dissemination of these publications many more persons will benefit from the results of our departmental research and development activities as they unfold at University Park.

Much of the information contained in this report was originally presented at the Trade and Industrial Teacher Education Research Seminar at Columbus, Ohio, on October 9, 1967. At that time the staff presentation seemed to provide conference participants with a fresh insight into a direction which research could take and the purposes which it could serve. I am optimistic that a similar visibility will accrue to others in the teacher education and research community who review our design with the future in mind.

The first section presents, in our collective opinion, a critique of current research reports which is a product of a thorough search of the literature and the application of a few well chosen criteria at least for the purposes of the report. David Bjorkquist and Richard Wiersteiner have produced the critique and subsequently a solid bibliography in the Appendix.

Curtis Finch and Joseph Impellitteri in the second section have designed a model and synthesized our staff position. To be more precise, Finch and Impellitteri mediate and reconcile our special biases into a collective point of view, an impossible and thankless task from the outset. Nonetheless, we have agreed and strongly support our position, more so we intend to implement it.

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INTRODUCTION

> Vocational education has been research-starved for fifty years. The problem is no better in trade and industrial teacher education and is perhaps even more critical. We can almost close our eyes, move in any direction and still be on target as far as research needs are concerned. Independent, uncoordinated research activity in teacher education will compound the chaos long before it will provide significant information of universal value.
> (Barlow, 1966)

Can we be satisfied with the research which has been conducted in trade and industrial teacher education? Can organization and direction of research activities improve the advancement of knowledge in this area? These and many other questions confront the concerned researcher and teacher educator.

In most brief terms it might be said that this report involves a search for research direction. More specifically, however, the paper outlines a position which serves as a foundantion for the study of trade and industrial education; and from the statement of position develops a framework upon which a continuing research program may be built.

The first section is directed toward the "state of the art" of research in trade and industrial teacher education. Here the characteristics and flavor of current research are summarized and scrutinized. The second section presents a model designed to better facilitate the study of trade and industrial teacher education.

Collection of reference material for the critique in Section I was conducted by the Research Staff of the Vocational Education Department at Penn State. The Library at University Park and the

many educational journals were primary sources of the reference search. Requests for materials were also made of several regional Research Coordinating Units, the ERIC Clearinghouse on Vocational and Technical Education, and several selected universities. Additional aid was rendered by Mr. Otto Legg and Mr. Lawrence Braaten of the U. S. Office of Education.

Due to the paucity of information in regular dissemination channels, this inquiry was very much dependent on reviews that had been recently completed. A bibliography of research completed by the Research Coordinating Units (compiled by the Center for Studies in Vocational and Technical Education at the University of Wisconsin) was consulted.

In securing much of the material presented here, the staff relied heavily on the esprit de corps which exists among vocational educators. Personal contact with various individuals did much to expedite the literature search and, at least for the present, seems to be the most efficient way to gather recently produced research material.

I. A RESEARCH CRITIQUE

Inasmuch as several comprehensive reviews of research in vocational education, including trade and industrial teacher education, have been completed recently (notably those by Schaefer and Tuckman, and Moss) the purpose of the literature search was to identify recent research in the rather exclusive domain of trade and industrial teacher education. In so doing it was hoped that a more adequate evaluation of the efforts and products of researchers might better examine and summarize the present state of the art.

As a basic assumption which underlies the Staff's review of research, it is emphasized here that the reviewers assumed the responsibility for the application of criteria to the review of the literature. The assumption is derived from the fact that few researchers, from the outset, would agree on the nature of the bibliography which makes up an appendix of this report. Three criteria, therefore, are the framework for the review.

First, only research studies completed since 1963 are included. Classified as research are systematic studies which add to the body of knowledge in trade and industrial teacher education. Severally excluded were articles, speeches, and reports of symposiums and conferences.

Secondly, only studies directly concerned with teacher education are included in this bibliography. Admittedly, studies of how students learn, or studies of new teaching techniques do contribute to the body of knowledge in teacher education. For the purposes of this review, however, only those studies considered to be directly concerned with teacher education are included.

Third, the study must have been in trade and industrial education, or have included trade and industrial education. Some studies were concerned entirely with trade and industrial education problems while in others, trade and industrial education was included with industrial arts or with other vocational subjects. The bibliography of relevent studies (Appendix A) contains 35 references.

Based upon the studies included in the bibliography, some general conclusions may be made:

1. A sizable number of the research reports have been conducted by students as part of a doctoral program.

2. Recent increases in federal funding have not seemed to greatly improve the sophistication of research which has been directed specifically toward trade and industrial teacher education.

3. The majority of the studies were concerned with either the teacher education "process" or the teacher education"product." In only a very few cases were attempts made to investigate the linkages between a teacher's development and his eventual teaching performance and effectiveness.

Two additional conclusions based on this review are worthy of more thorough consideration for their implications. First, very few of the studies cited seem to have grown out of theoretical framework. Too few attempts have been made to build on the previous work of other researchers, or to accommodate a piece of research into a greater montage. The work of the philosopher is not contrary to that of the researcher, and the best ideas of both should meet in the planning of research studies.

Secondly, it can be readily concluded that research in trade and industrial teacher education is still in an embryonic state. This is indicated by the volume of "social bookkeeping" research on the one hand, and the scarcity of research designed to open new vistas of education on the other. Social bookkeeping research will always be needed, and as such it can be a basis upon which meaningful studies can be produced. A fair generalization of our position in the present state of the art suggests that we have to know where we are in order to establish direction and degree of thrust, but an excessive proportion of our present research is concerned with where we are.

II. A MODEL FOR ACTION

As has been previously mentioned there have been a number of reviews compiled recently which describe the "state of the art" in trade and industrial teacher education research. Interestingly enough, the authors make reference to a shortcoming which most trade and industrial teacher education studies possess.

In his review of research dealing with the broader field of vocational-technical teacher education Moss (1967) asserts that:

> . . . with some exceptions, of course, little has been done which materially contributes to the development of a science of teacher education. We need a system of verified principles which will permit us to understand and control the teacher education process. At present, we are still operating programs on the basis of tradition, "convention wisdom," and personal experience.

O'Brian and Schaefer (1966) summarize their findings as follows:

> It is apparent that little has been done during the past decade to take a hard look at trade and industrial teacher education. It might be rationalized that we are just too busy, the challenge too great and the time too short.

On the basis of these remarks and conclusions reached in the critique, the following point is worthy of consideration. Lacking a theoretical framework to guide research efforts, individual research projects become entities or closed systems, bearing no identifiable relationship to other scholarly work. As such, research in trade and industrial teacher education suffers from lack of generalizability and acceptability. It is not unlikely that research being conducted at University X enjoys little appreciation from teacher educators

in College Y. In fact, it may well be that research being conducted by a teacher educator at University X may not be appreciated by other members of the teacher education staff at the same institution.

The purpose of this paper is to describe a point of departure and to advocate the acceptance of a common operational framework by researchers and teacher educators in trade and industrial education. It is certainly not proposed that all researchers and all teacher educators accept the same framework, but that all researchers and teacher educators in trade and industrial education accept some framework which will serve as communications medium and point of reference.

How then should a frame of reference be developed? What course of action might be the most productive? One alternative which seems to be sound might build a foundation from selective and viable literature in general teacher education. Much relatively sophisticated research has been done in the general teacher education field, a good deal of which may be applicable to the trade and industrial area.

The most recent comprehensive review of research in the general field of pre-service and in-service education of teachers, however, is not all encouraging. Denemark and MacDonald (1967), indicated in their review that:

> Even casual persual of the research literature reveals a lack of theory. It is, indeed, almost impossible to identify the theoretical basis for most of the studies reported. As a consequence it is often difficult to relate studies to each other or to identify the need for new studies. This lack of integrating framework has resulted in an obvious divorce of theory and practice.

The condition in which general teacher education finds itself is just the kind of situation which should be avoided by trade and

industrial educators. The "What" approach to solving problems with research has preceded the question of "Why?" The lack of an "integrating framework" has perpetuated the gap between researchers and teacher educators.

A second alternative is intimated by O'Brian and Schaefer (1966). In their recent review of trade and industrial teacher education research the following statements are made:

> But the fact remains, more studies of the sophisticated type and less of pure conjecture need to be undertaken. Answers to questions of where we are, and where we should be going cannot be found until we do just that.

Not many trade and industrial teacher educators would take exception to the need for more sophisticated research studies in the field. There is no doubt that a more rigorous and disciplined attack on the many crucial problems in our field would result in improvement. However, the recommendation does not go far enough. With only an increase in the sophistication level of a number of isolated research studies we would still be in danger of falling into the same confused state currently characterizing general teacher education research.

A necessary ingredient to be added to O'Brian and Schaefer's recommendation is one suggested by Barlow (1966). He states that:

> The need of the future is a program of teacher education research planned so that in total it advances knowledge in areas of significant need. Our research needs occur throughout the entire continuum of research from the immediately useful information to that which cannot be pegged in a time sequence in relation to its practical need.

Barlow's suggestion is a planned program of research. But upon what basis does one decide the needs of trade and industrial teacher education? A planned program of research must grow out of some preceding development.

The element which Moss (1967) introduced in his recent paper, that of the "research paradigm", seems to be quite appropriate. He indicated that, "The attainment of satisfactory answers to our practical vocational-technical teacher education questions is therefore viewed as being dependent upon long-term programmatic research efforts, facilitated by the adoption of some research paradigm." The adoption of the research model or paradigm is crucial to the success of a planned program of research. However, a research model, developed by researchers, phrased in their language is most likely to be understood only by researchers. The teacher educator still has no basis for communication with the researcher, and the divorce theory and practice remains.

What is desperately needed in trade and industrial teacher education is a model, paradigm, or framework to which not only the researcher but the teacher educator as well can relate and understand. Working in the broader framework of this type of model, the researcher can develop those research paradigms which he finds useful. The teacher educator, on the other hand, can relate his problems in terms of the framework so as to provide the researcher with a point of focus. Communications between researchers and teacher educators would thus be vastly improved.

The model which is presented in this paper (Figure 1) represents the existing teacher education process in a dynamic way. It provides not only a categorical system of process and effects, but a series of interdependencies as well.

The trade and industrial teacher education model may, in many respects, be viewed as a general teacher educational model. As a general model the diagram conveys that: a number of persons with certain

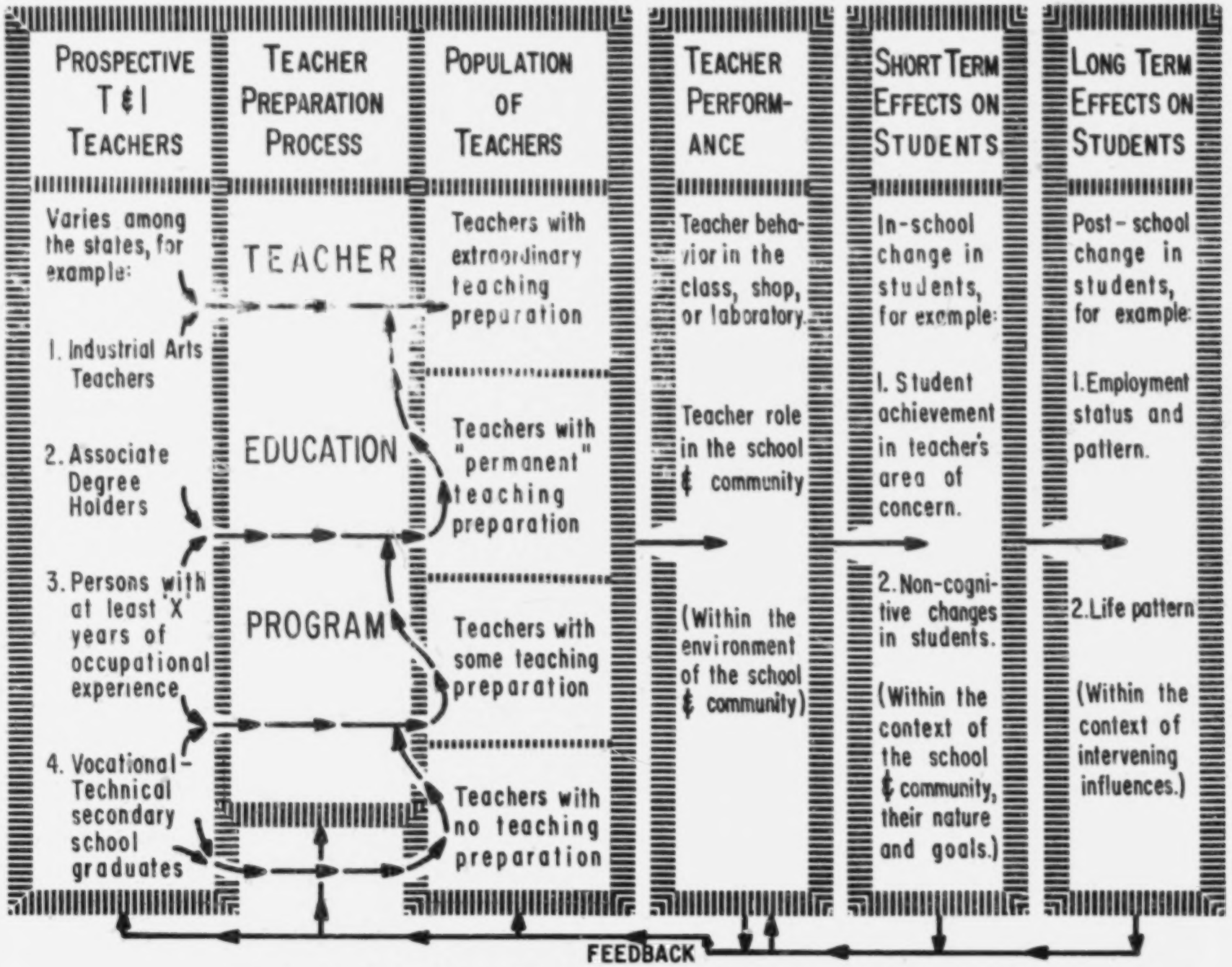
PROSPECTIVE T & I TEACHERS
TEACHER PREPARATION PROCESS
POPULATION OF TEACHERS
TEACHER PERFORM-ANCE
SHORT TERM EFFECTS ON STUDENTS
LONG TERM EFFECTS ON STUDENTS
Varies among the states, for example:
1. Industrial Arts Teachers
2. Associate Degree Holders
3. Persons with at least X years of occupational experience
4. Vocational-Technical secondary school graduates
TEACHER EDUCATION PROGRAM
Teachers with extraordinary teaching preparation
Teachers with "permanent" teaching preparation
Teachers with some teaching preparation
Teachers with no teaching preparation
Teacher behavior in the class, shop, or laboratory.
Teacher role in the school & community
(Within the environment of the school & community)
In-school change in students, for example:
1. Student achievement in teacher's area of concern.
2. Non-cognitive changes in students.
(Within the context of the school & community, their nature and goals.)
Post-school change in students, for example:
1. Employment status and pattern.
2. Life pattern
(Within the context of intervening influences.)
FEEDBACK

Fig.1 A schematic model for the study of T & I teacher education

VCS-PSU

characteristics who are interested in teaching undertake some type of teacher preparation; of those, some succeed and obtain a teaching job, and eventually have some short-term and long-term effects on their students by performing in certain ways; and the way they perform as well as the short and long-term effects on students become bases upon which to revise the available pool of potential teachers, the process of preparing them, and the qualifications and competencies they must have to teach.

Because it is a trade and industrial teacher education model, however, it possesses some unique features. First, four avenues are open to a person interested in obtaining a teaching position in trade and industrial education (progressing from Column 1 to Column 3). Generally in teacher education only one or possibly two avenues are open, each of which must be directed through the teacher education program (Column 2). Second, the number of categories in Column 3 and the paths to get from Column 2 to Column 3 are fewer in a general teacher education model. Finally, the types of characteristics and/or criteria in Columns 1, 4, 5, and 6 that are considered to be important to teacher educators outside of trade and industrial education would differ greatly.

Just a glimpse at the proposed model is sufficient to demonstrate its lack of depth. The authors submit that the simplicity of the model is its major strength. It is simplicity which is perceived to be its primary contribution. Working within the confines of the model, one can develop as much detail as he feels is necessary to study a particular problem.

An additional contribution of the model is to superimpose the broader frame upon the specific area under study and to demonstrate the major contingencies within the frame. Thus, if one were interested in the general objective of improving the teacher education program he could work within the frame and account for contingencies between:

1. The number, type and availability of potential trade and industrial teachers and their effect on the teacher education program.

2. The teacher education program and its effect on the population of trade and industrial teachers.

3. The teacher education program and its effect on teacher performance and the resulting feedback of teacher performance to the program.

4. The teacher education program and its effect through teacher performance on the behavior of students in school and out of school.

The teacher education program viewed in this way does not exist in isolation. It exists as one aspect in the whole process outlined in the model. One of the outstanding shortcomings of research in trade and industrial teacher education has been a focus upon isolated aspects of the process to the exclusion of the essential dependencies between these aspects.

The utility of the particular model presented is that:

1. It allows for the identification of contingencies involved in the educative process.

2. The teacher education program is placed within the larger context of the educative process.

3. It ties together the direct and indirect effects of teacher education by way of feedback to the teacher preparation process.

4. It provides a common reference for both the researcher and the teacher educator.

Because of the advantages which the model provides it is recommended that research efforts to be undertaken in the field should be: (1) developed within the frame of the model; and (2) justify themselves on the basis of the relationship of study in a particular problem area to the contingent problem areas outlined in the model. If these two criteria are imposed upon research efforts, it is more likely that "project" research will make a substantial contribution to an organized body of knowledge in trade and industrial teacher education. As valuable as programmatic research efforts can be, the resources in the field are currently limited. Thus it would be at least inefficient to disregard the potential value of individual project type studies.

It must be re-emphasized at this point that the model is not a research model, but a trade and industrial teacher education model. Essentially its purpose is to improve communications in the field -- within the specialty areas of teacher education and research, and between the specialists in those areas as well. Adoption of such a model provides a starting point from which research models can be developed.

APPENDIX A

Selected Bibliography of Research in Trade and Industrial Teacher Education (1963-1967)

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APPENDIX B

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